A Mathematical View of Fluid Motions

Fluid dynamics, the study of the motion of liquids and gases, is one of the classical branches of applied mathematics. Sciences such as aerodynamics, hydrodynamics, meteorology and oceanography, to name a few, draw heavily on the mathematics of fluid mechanics for their quantitative underpinnings. The central theme of this class is the development of the mathematics for understanding the basic variables that describe the motion of fluids: flow velocity, pressure and density.

Fluid dynamics is an application of the mathematics of partial differential equations. The core aims of this class are: deriving the equations of motion from basic physical principles, learning differential equation techniques for finding special solutions, and most importantly, interpreting such solutions in the context of understanding fluids. Computer visualization will be an important accompaniment to the lectures and assigned work. The rudiments of numerical computing and graphics will be introduced through the use and modification of downloadable Matlab scripts.

The ultimate goal is to use mathematics to reveal, in a quantitive way, the mysteries of the motions of liquids and gases. Why does water swirl as it drains from the bathtub? Why do radiator pipes make a lot of banging sounds? Why does a curve-ball curve?

Professor:	David Muraki, office TLX 10538, phone 604.291.4814
Lectures:	M 2:30-4:20pm in AQ 5037 W 2:30-3:20pm in AQ 5018
Office Hours:	thursday 2:30-4:30pm by special appointment (arrangements by phone/e-mail)
Readings:	*Elementary Fluid Dynamics* DJ Acheson, Oxford (1990)
Webpage:	visit *www.math.sfu.ca/∼muraki*
E-Mail:	essential channel for class communications *math-462@sfu.ca*: central class e-mail address *muraki@fraser.sfu.ca*: private class-related e-mail correspondence *muraki@math.sfu.ca*: urgent correspondence only please
Computing:	Matlab is the recommended computing environment lecture & homework scripts will be posted on class webpage Matlab is accessible from the computer lab in AQ3144 PC student versions can be ordered from *www.mathworks.com*
Responsibilities:	weekly assignments active participation in class & e-mail discussions midterm & final exam/project